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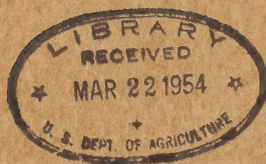


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MOSQUITO SURVEY and CONTROL

MT. HOOD NATIONAL FOREST

July 1, 1934





# INTRODUCTION

The establishment of G.O.P. camps in the National Forests, as they were by the abundance and loss of efficiency from the mosquitoes, prompted several requests by the members of the Forest Service and individuals living in the camp area for control of mosquitos in 1933. A survey was made two days after these requests were received, but the inevitable occurred after the mosquitoes were on the wing; consequently nothing could be done in reducing their numbers, since mosquito control depends primarily upon the destruction of the mosquito wingless and the water.

It was accordingly decided, early in the Spring of 1934, to make a systematic survey and if possible a series of practical control measures at convenient points where mosquitoes had been a serious pest and it was known that G.O.P. camps would be established. At the same time, Mr. T. H. Stewart, <sup>43</sup> **MOSQUITO SURVEY and CONTROL**, National Forest, gathered information regarding control of the pest, and also to only constituted a message to members of the G.O.P. camp but also to residents of that district. **GOVERNMENT CAMP, OREGON**, this area might well serve as one of the best places to demonstrate the practicability of mosquito control in a mountainous district. A general foreman, having knowledge of mosquito control activities was placed in charge of field operations. **MT. HOOD NATIONAL FOREST**, to him for the purpose of inspection and control.

The work was begun on April 15, and it was found that because of the dry and well drained nature of the wingless had already reached pupal stage, or in other words, the stage from which the adult stage currently emerges. This fact **C. E. Cody** was that the work was started about two weeks late.

**DESCRIPTION OF THE AREA OF INTEREST TO MOSQUITO CONTROL.**

Mount Hood, near the base of the northern slope of Mt. Hood, is a valley by rubber steep and irregular hills on all sides. It is situated on the drainage of which is toward the north and west, between the hills, into the Salmon River. Although there is a good slope in the region, water collects in many places and stands for rather long periods. These situations are mainly in open meadows, some of which have been used for cattle in the winter. As the melting snow begins to flow, it collects in these places, covering them to several inches of water, and keeps up the the vertical grass and other brush. A great quantity of better ground is consequently covered by several inches of water, or water for several weeks. It was this fact that was found to be the principal mosquito breeding ground. After several weeks the water ran to the original lake basins, leaving behind ground which presents an ideal place for mosquitoes of this species to lay their eggs.

## Direction

of

U. S. Dept. of Agriculture, Bureau of Entomology,  
H. H. Stage, Associate Entomologist  
438 U. S. Courthouse  
5a (Portland, Oregon.)  
July 1, 1934

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## INTRODUCTION

The establishment of C.C.C. camps in the National Forests, hampered as they were by the nuisance and loss of efficiency from the mosquito pest, prompted several requests by the members of the Forest Service and individuals living in the camp area for control of same in 1933. Inspection and survey work was done when these requests were received, but they were invariably received after the mosquitoes were on the wing; consequently nothing could be done in reducing their numbers, since mosquito control depends primarily upon the destruction of the mosquito wriggler while in the water.

It was accordingly decided, early in the Spring of 1934, to make a systematic survey and if possible a series of practical control tests at some convenient point where mosquitoes had been a serious pest and where it was known that a C.C.C. camp would be established. At the same time Mr. T. H. Sherrard, then supervisor of the Mt. Hood National Forest, requested information regarding control of the pest, and since they not only constituted a menace to members of the C.C.C. camp but also to residents of that district, it was decided that this area might well serve as one of the best areas to demonstrate the practicability of mosquito control in a mountainous district. A general foreman, having some knowledge of mosquito control activities was placed in charge of the field operations. C.C.C. laborers were assigned to him for the purpose of inspection and actual culling operations.

The work was begun on April 5th, and it was found that because the season was so well advanced some of the wigglers had already reached the pupal stage, or in other words, that stage from which the adult mosquito directly emerges. This fact would indicate that the work was started at least two weeks late.

TOPOGRAPHY OF THE AREA AS IT RELATES TO MOSQUITO CONTROL.

Plaza Camp, near the base of the southern slope of Mt. Hood, is surrounded by rather steep and irregular hills on all sides. It is situated in a valley, the drainage of which is toward the south and west, between the hills, into the Salmon River. Although there is a good slope in the whole region, water collects in many places and stands for rather long periods of time. These situations are mainly in open meadows, some of which have a permanent body of water in the center. As the melting snow rushes down the slopes it collects in these ponds, causing them to overflow their banks and reach up into the marginal swamp grass and alder brush. A great quantity of border ground is consequently covered by several inches of water, which remains for several weeks. It was this land that was found to be the principal mosquito breeding ground. After several weeks the water recedes to the original lake borders, leaving meadow ground which presents an ideal place for mosquitoes of this species to lay their eggs.

Another example of a large breeding area is found in the Salmon River meadows. In this instance there is no permanent body of water in the center but the whole area, which is over three miles long and approximately one-half

The establishment of U.S.C. camps in the National Forests, especially in the mountains and areas of difficult access, was made possible by the cooperation of the National Forest Service and the U.S. Army. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla.

It was not until 1944, early in the spring of 1944, in fact, that it was possible to conduct a series of successful gorilla research expeditions. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla.

The work was begun on April 15, and it was found that because the gorilla was so shy and elusive, it was necessary to build a series of camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla.

# TOPOGRAPHY OF THE AREA OF THE NATIONAL FOREST

The area of the National Forest is located in the mountains of the National Forest. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla. The U.S. Army, in the early part of 1944, began to build camps in the National Forests for the purpose of conducting research on the habits of the mountain gorilla.

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a mile wide, is covered by melting snow and rainwater from the surrounding hills. The entire meadow is a potential breeding ground, and wrigglers are found in the numerous pockets, pot-holes, and depressions everywhere. Also in several instances there are lakes caused by beaver dams, and surrounding these lakes marginal land which is covered by water for some time after the snow begins to melt.

#### GOVERNMENT CAMP SWAMP

This swamp is approximately one square mile in size and is located to the south of the main section of the village. It is a large meadow full of numerous large and small semi-permanent pot-holes. These pot-holes are flooded by melting snow and rainwater, where it remains for several weeks. Mosquito larvae were taken in numbers over the whole area.

It should be clearly understood that the great abundance of mosquito breeding takes place in the typical marginal meadow ground and not from the permanent ponds nor from the numerous swiftly-moving streams in this section. Drainage is possible in practically every instance, but some labor is necessary to connect these meadows and ponds with the adjacent streams in order to allow the snow water to move off quickly. The climax forest in that area consists of Pine, Spruce, and Hemlock on the slopes of the hills. The marginal ground has grown up to Alders, Willows, and sedges.

#### MOSQUITO SPECIES

Before mention is made of the species of mosquitoes occurring in this district, it might be well to tell something of the general habits of the mountain or snow mosquitoes. When one thinks of mosquito breeding it is usually considered that they breed in stagnant or brackish types of water but such is not the case with the mosquito species mentioned in this discussion. Neither do they lay their eggs on the water such as the common habit of the ordinary house, malaria, or rain-barrel mosquito. Instead, they lay their eggs directly on the ground, in the meadows mentioned above, during June, July, and August. These eggs lay on the ground and do not hatch until they are flooded by the melting snow water the following season. There is then, normally, but one brood compared to areas in which the eggs are laid on the water and where the control consists of destroying several broods each season. Because there is but one brood, practical control is a rather short but hasty problem since the wrigglers are found over a wide area and one spraying of oil is all that is necessary to control them for that year. All of these species are known as snow water or mountain mosquitoes, but all may be controlled by the same treatment.

The most important species found in this area are as follows:

#### Aedes Hexadentus, Dyar

This is a high altitude species breeding in abundance in meadows, in early pools filled directly by snow water. In the higher valleys they are the earliest mosquitoes encountered. It is the most prevalent mosquito in the Mt. Hood areas, and was taken in abundance in the Salmon River and Plaza Camp meadows. The larvae were found in nearly every mosquito

a wide area, is covered by various trees and vegetation from the surrounding hills. The entire area is a potential breeding ground, and vegetation found in the immediate vicinity, particularly the dense forest, is covered by various trees and vegetation from the surrounding hills. The entire area is a potential breeding ground, and vegetation found in the immediate vicinity, particularly the dense forest, is covered by various trees and vegetation from the surrounding hills. The entire area is a potential breeding ground, and vegetation found in the immediate vicinity, particularly the dense forest, is covered by various trees and vegetation from the surrounding hills.

#### Vegetation and Wildlife

This area is approximately one square mile in size and is located in the south of the main section of the village. It is a large wooded area with various types of trees and vegetation. The area is covered by various trees and vegetation from the surrounding hills. The entire area is a potential breeding ground, and vegetation found in the immediate vicinity, particularly the dense forest, is covered by various trees and vegetation from the surrounding hills.

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#### Vegetation and Wildlife

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The vegetation and wildlife found in this area are as follows:

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breeding situation surveyed, and frequently Aedes fitchii, Aedes cinereus, and Aedes storiniis were associated.

#### Aedes storiniis, Dyar

Larvae of this species are found in early forest pools and occur in ditches and excavations. In this survey they were found breeding in uprooted tree depressions and small pot-holes scattered over the meadows. It was especially noted that breeding of this mosquito occurred in pools having no vegetation. They were taken from ditches in the meadow adjacent to Plaza Camp and also in pot-holes southwest of Government Camp.

#### Aedes fitchii, Felt & Young

This is an early spring mosquito found in wooded swamps, near water pools, and open meadows. The larvae were found in shallows along the shores of lakes and ponds, and were abundant in small, shallow pools well shaded by trees and brush, as well as shaded portions of the meadows.

#### Aedes cinereus, Meigen

The larvae of this species are usually found in small shallow woodland pools in early spring; the adults emerge during the months of May and early June. At Government Camp this species were found in abundance in the flooded areas covered by stands of timber and dense alder brush, as well as in the small meadows surrounded by dense stands of timber.

#### DIRECT CONTROL MEASURES

All snow water pools, pot-holes, and flooded meadows were inspected and where larvae were found were immediately sprayed by two laborers equipped with Meyer type knapsack sprayers. Within twenty-four hours after spraying the situations were again inspected to determine the percentage of kill. In all instances a hundred percent kill was obtained. Antists of several of the lakes were enlarged, permitting a greater escape of water, thus lowering the water in the lakes from one to two feet. By drawing the water from around the dense growth of sedge grass and alder brush back into the lake considerable labor in killing was saved.

For spraying purposes 150 gallons of diesel fuel oil was used. The approximate cost of this oil is six cents per gallon, and it was used at the rate of 20 gallons to the acre of water surface.

#### SEMI-PERMANENT CONTROL

Approximately one and one-quarter acres opposite Plaza Camp were cleared of Alder brush in a start to open up a ditch draining the adjoining meadow. One hundred and fifty yards of new ditches were also dug in this meadow and the old ones cleaned of debris. Because of lack of funds this work came to a close on June 1st and prevented the development of a drainage system for this area.

#### RECOMMENDATIONS

Recommendations for semi-permanent control consist mainly in ditching



so that the water may be quickly drained into Frost Creek. More breeding was found in this meadow than in any other area in the vicinity of Plaza Camp, and as it is approximately only two miles air-line from Plaza Camp, continued work would greatly reduce the mosquito pest at the Camp.

Plaza Camp Area: Recommendations for semi-permanent control; adequate ditches through the meadow would carry the water into the lakes without causing it to flood a great deal of ground. The canlets of the lakes, all of which lead to Mud Lake and finally Mud Creek, should be enlarged and cleared of debris; so as to provide a more rapid means of carrying off the snow water.

Government Camp Swamp: Recommendations for semi-permanent control; the meadow should be ditched so as to provide an efficient system of drainage. This is a relatively simple matter since there is an excellent fall over the whole area. The small pot-holes could be filled with material taken from the ditches to excellent advantage.

- SUMMARY -

Four important species of mosquitoes were taken while this control and survey work was being done. They are: Aedes hexodontus, Aedes aboriginis, Aedes fitchii, Aedes Youngi; and Aedes cinebrus, Aedes Youngi. These species lay their eggs directly on the damp ground which is subject to spring floods of snow and rainwater. The eggs remain there during the winter and hatch the following spring when covered by water.

Direct control by spraying oil on infested water greatly reduced the mosquito pest in this area. Compared to former years the mosquito pest was of no consequence whatever. An even better reduction could have been expected had control activities started two or three weeks earlier.

The approximate cost of the direct control project was as follows:

1 General Foreman entomologist	
Salary (April 8th-May 31st)	\$345.00
Mileage and subsistence	141.55
2 C.O.C. laborers, 12 days	55.92
150 gallons Diesel Oil	9.97
	<hr/>
	\$460.94

Personnel and requirements for direct control by spraying oil may be estimated as follows: 1 Foreman, 2 oilers, and 300 gallons of oil. The date for beginning work will depend upon the season, but it should be well in advance of the first freshets.

Recommendations for semi-permanent control include a well developed system of drainage ditches which will carry the water quickly off of the meadows into Mud Creek and Salmon River





Salmon River Meadows.  
An oiler spraying infested water. An example of direct control.



Flats near Kenai.  
The drainage of ground of this nature will prevent mosquito breeding.  
An example of semi-permanent control.





View from Rainbow.  
General view of the three mile long flats.



Detailed view of the above mesa, after the flood waters had receded.





Mud Lake Area.

Typical mosquito breeding meadows. These areas can be controlled by a system of ditches.



Upper ponds in Mud Lake Area.

The water level of these ponds can be regulated by ditches.  
Plaza Camp Airfield at upper right.



FIELD MAPS  
ARE OF  
MT. HOOD NAT'L FOREST  
OREGON

SHOWING  
MOSQUITO BREEDING AREAS  
AS SUBMITTED BY  
C.E. CODY.

LEGEND



MAIN HIGHWAY.



ROADS ACCESABLE TO MOTOR TRAFFIC.



TRAILS



LAKES



TEMPORARY LAKES



MEADOWS



SWAMPS

DRAFTING - G.F. OSLER.



GOVERNMENT CAMP AREA

75S R8½E.

H. C. C.

SCALE 1 in = 1320 ft



C

C

C

C

SALMON RIVER MEADOW AREA

H.S.R.M.

SCALE 1 in = 1320 ft





LOWER SALMON RIVER MEADOW AREA

H.S.R.M.

SCALE 1 in = 1320 ft.

R 8 1/2 E

R 9 E

13

SALMON RIVER

SALMON

RIVER

CHOW'S CREEK

18

24

19

725  
745



SUMMIT CAMP & MUD LAKE AREAS

H.S.C. & H.M.L.

SCALE 1 in = 1320 ft

